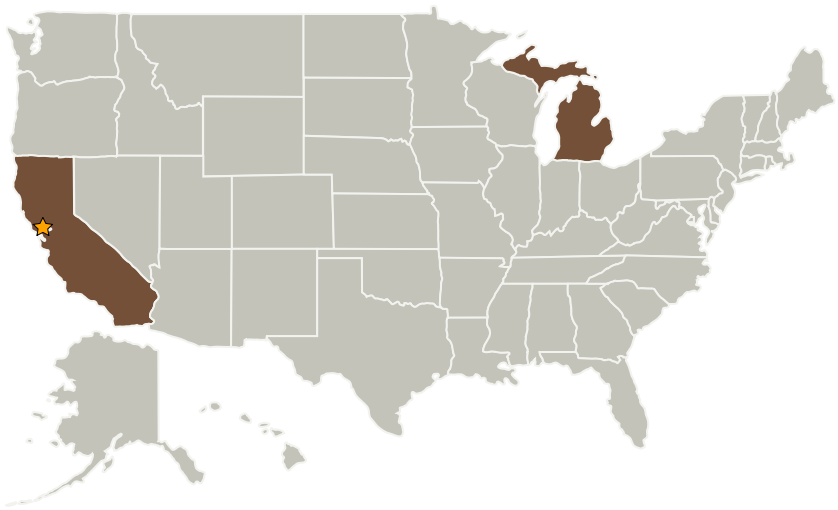
Nano-Engineered Structural Joints, Phase I

Completed Technology Project (2007 - 2007)

Project Introduction

A versatile class of high-performance structural joints is proposed where massive interatomic bonds over the large surface areas of nanostructured surfaces constitutes the primary joining mechanism. The new nano-engineered joints embody nanomaterials which are self-assembled and anchored onto the joining surfaces. Compatible functionalization of nanomaterials on opposite surfaces creates favorable energetic conditions for their effective engagement and joining via massive primary (chemical) bond formation. Complementary self-assembly techniques will be used for rapid, low-cost, energy-efficient and environmentally friendly processing and anchorage of nanomaterials upon substrate surfaces. Various nanomaterials and anchorage conditions can be used for different substrates (ceramics, metals, polymers, composites) and service requirements. The length of nanomateials would be selected to compensate for the surface roughness. The proposed joints can be engineered to provide broad ranges of mechanical performance, accommodate various material incompatibilities (e.g., thermal expansion mismatch), and different functionalities (e.g., thermal/thermal conductivity, or reversibility). The proposed Phase I research will establish the theoretical potential of the proposed nano-engineered joints, and will develop and characterize a precursor joint system embodying the proposed joining principles in order to verify the technical merits of the technology and its commercial potential.

Primary U.S. Work Locations and Key Partners



Nano-Engineered Structural Joints, Phase I

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

Nano-Engineered Structural Joints, Phase I

Completed Technology Project (2007 - 2007)

Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Technova Corporation	Supporting Organization	Industry	Okemos, Michigan

Primary U.S. Work Locations	
California	Michigan

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.2 Thermal Control Components and Systems
    - TX14.2.3 Heat Rejection and Storage